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February 19, 2015

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Jennifer L. LaPoma
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United States Environmental Protection Agency
290 Broadway, 17th Floor,
New York, New York 10007-1866

Re: New Cassel/Hicksville Ground Water Contamination
Upgradient Plume Impacts on OU1 Groundwater Quality
New Cassel Hicksville Contaminated Groundwater Superfund Site

Dear Ms. Kivowitz and Ms. LaPoma:

During previous meetings, IMC Eastern, Corp. (IMC) has presented data demonstrating that the Sylvania and GI/Vishay facilities, collectively referred to as the "Upgradient Parties," have, separately and together, had significant chlorinated solvent releases on their properties that have caused and are causing impacts to groundwater quality within the New Cassel Industrial Area (NCIA) and Operable Unit 1 (OU1) of the New Cassel Hicksville Groundwater Contamination Superfund Site (NCHGWCS). Recent investigations performed by the United States Army Corp of Engineers (USACE) confirm these impacts. This letter presents a summary of relevant data, including recent data collected by the USACE, which conclusively demonstrate that the Upgradient Parties have impacted groundwater quality within the NCIA and OU1. Data presented in this letter are consistent with IMC's individual comments and the NCIA Parties' joint comments to US EPA's Proposed Remedial Action Plan.

The Upgradient Plumes result from multiple source areas present at the Sylvania and GI/Vishay facilities, located northeast of the NCIA (Figure 1). Environmental investigations have been undertaken at these sites since the 1980s with oversight from county, state, and federal authorities.[1] Chlorinated solvents were historically used at both sites. Elevated tetrachlorethylene (PCE) and/or trichloroethylene (TCE) concentrations in groundwater, consistent with the presence of non-aqueous phase liquids (NAPL), have been found at the Sylvania and GI/Vishay Sites. PCE concentrations up to 32,000 µg/L (P-108, 74 ft-below ground surface [bgs])[1] have been detected at the Sylvania facility, and TCE has been detected at concentrations up to 48,000 µg/L (W-1-75, 65-75 ft-bgs)[2] at the GI/Vishay facility.

[1] Bolduc, J. 2013. Letter Report to J. Cantanzarita (USEPA) re: Supplemental Remedial Investigation Technical Memorandum, New Cassel/Hicksville Ground Water Contamination Site, Nassau County, New York. 222p., July 19. [R2-0011894 - R2-0012115.]

[2] ESC Engineering of New York, P.C. (ESC). 2006. "May 2006 Semiannual Groundwater Monitoring Report, Former General Instrument Corporation Site, Hicksville, New York." 133p., August 23. [SDOH252658 - SDOH252789.]

Multiple lines of evidence demonstrate that contamination from the Sylvania and GI/Vishay facilities has migrated in a southwesterly direction into both the NCIA and OU1 and has affected groundwater quality in these areas. These include:

1. Groundwater Quality Data Demonstrate that the Upgradient Plume has a Distinct Chemical Signature and the Plume is Migrating into the NCIA and OU1

While the chlorinated solvents present in the comingled Upgradient Plumes (PCE and TCE) are the same as those used by some facilities in the NCIA, the chemical signature of the contamination from the Upgradient Parties is different than the signature associated with the groundwater contamination at the Frost Street Sites within the NCIA. Contamination from the Upgradient Parties is TCE enriched, meaning that is has higher molar concentrations of TCE than PCE. The TCE enrichment is caused by the historical releases of TCE from waste solvent storage tanks on the GI/Vishay property. In contrast, the NCIA Eastern Plume is PCE enriched, having higher PCE molar concentrations than TCE.

The contamination from the Upgradient Parties is discernible from the Frost Street plume within the NCIA and in OU1 based on chemical signature (TCE enrichment) and depth, prior to comingling with the NCIA Eastern Plume. Data obtained from vertical profile borings installed between 2008 and 2012 (Figure 2), summarized below, support this conclusion.

Vertical Profiles Installed Upgradient and Side-Gradient of NCIA

Numerous vertical profiles have been installed upgradient and side-gradient of the NCIA. LP-01, LP-02, LP-03, LP-04, and WP-01 were installed by GI/Vishay in 2008; MW-208 and MW-202 were installed by the USACE in 2012. Elevated PCE and TCE concentrations were observed in each of these locations at depths ranging from 75 to 400 ft-bgs (Figures 3 – 9). Based on groundwater flow direction and the depth of impacts, groundwater contamination observed at these locations can only be the result of the Upgradient Plume and cannot be caused by any NCIA-related source. Specific details relating to key vertical profiles installed along the boundary of the NCIA where the presence of the Upgradient Plume has been confirmed is provided below.

- LP-02 and MW-202 are located northeast (upgradient) of the NCIA, downgradient of the Sylvania and GI/Vishay facilities (Figure 2). The concentration depth profiles (Figures 3 and 4) indicate an enriched TCE plume (relative to PCE) with concentrations up to 730 µg/L between the depths of approximately 300 and 400 ft-bgs.[3,4] The chemical signature at these locations is consistent with the Upgradient Plume.

  The USACE installed a permanent monitoring well at MW-202 at a depth of 380 ft-bgs.[4] Four groundwater samples collected between June 2012 and August 2013 contained TCE at concentrations ranging from 680 to 1,300 µg/L.

- LP-03 is located upgradient of the Frost St. sites, east of the NCIA (Figure 2). The concentration depth profile (Figure 5) indicates elevated concentrations of PCE (up to 1,100 µg/L) and TCE (up to 1,500 µg/L)[3] between the depths of approximately 210 and

[3] WSP Engineering of New York, P.C. (WSP). 2010. "Interim Phase VI Remedial Investigation Report and Supplemental Work Plan, Former General Instrument Corporation Site, Hicksville, NY." 190p., May 21. [ALBEM00165137 - ALBEM00165326.]

[4] US Army Corps of Engineers. 2014. Data Evaluation Report, Sylvania Corning FUSRAP Site, Hicksville, NY. April.

400 ft-bgs. The plume at this location is enriched in TCE relative to PCE, consistent with the Upgradient Plume chemical signature.

- WP-01 is located on the edge of the NCIA, side-gradient from the Frost St. sites (Figure 2). The concentration depth profile (Figure 6) indicates elevated concentrations of PCE (up to 500 µg/L) and TCE (up to 3,700 µg/L)[3] between the depths of approximately 190 and 400 ft-bgs. The plume at this location is enriched in TCE relative to PCE, consistent with the Upgradient Plume chemical signature.

In summary, the vertical profiling performed upgradient and side-gradient of the NCIA clearly demonstrate that the TCE-enriched contamination from the Upgradient Parties is present immediately upgradient of the NCIA. One can reasonably conclude, given the high concentrations at which PCE and TCE have been detected immediately upgradient of the NCIA and the southwesterly groundwater flow direction, that contamination associated with the Upgradient Parties has impacted NCIA groundwater.

Vertical Profile Installed Within the NCIA

WP-07, installed in 2008 by GI/Vishay, is located at the Frost St. sites (Figure 2). The concentration depth profile at this location indicates the presence of two plumes. A plume associated with Frost St. has a PCE fingerprint (Figure 10; PCE enriched relative to TCE), with concentrations as high as 31,000 µg/L.[3] A deeper plume is located at depths from approximately 200 to 430 ft-bgs (Figure 10). The deeper plume is enriched in TCE with concentrations as high as 1,800 µg/L,[3] indicative of the contamination from the Upgradient Parties. Groundwater quality data from vertical profile WP-07 confirm that the contamination from the Upgradient Parties is migrating into the NCIA.

Vertical Profiles Installed Within or Adjacent to OU1

Three vertical profiles have been installed within or adjacent to OU1. MW-209 was installed in 2012 by the USACE;[4] WP-06 and WP-04 were installed in 2008 by GI/Vishay[3] (Figure 2). The TCE-enriched chemical signature at these three locations (Figures 11 – 13), with concentrations up to 4,200 µg/L,[3] confirm the presence of the Upgradient Plume. Additionally, at WP-06, the chemical signature indicates that the contamination from the Upgradient Parties has commingled with the NCIA Eastern Plume; the concentration depth profile at this location (Figure 12) indicates a shallower, PCE-enriched zone from 220 to 300 ft-bgs (Eastern Plume) and a deeper TCE-enriched zone from 300 to 480 ft-bgs (Upgradient contamination).

Taken together, data from the vertical profiles conclusively demonstrate that the Upgradient Plume has migrated into both the NCIA and OU1. Figure 2 presents a plan-view depiction of the confirmed presence of the Upgradient Plume within the NCIA and OU1 based on groundwater quality data from the vertical profiles. Note, the western extent and the vertical depths of the contamination from the Upgradient Parties within the NCIA in OU1, and particularly the area where it is commingled with the Eastern Plume, has not yet been fully delineated.

2. A GI/Vishay Marker Compound (1,2-Dichlorbenzene) has been Detected Immediately Adjacent to NCIA

In addition to the chlorinated solvent chemical signature discussed above, 1,2-dichlorobenzene (1,2-DCB) is a marker of the contamination from the Upgradient Parties since it is uniquely

associated with the GI/Vishay facility. Since 1,2-DCB was colocated with PCE and TCE in their on-site source areas,[5] GI/Vishay has used this compound to delineate the approximate extent of their PCE and TCE plumes, although the PCE and TCE plumes are expected to migrate farther based on their fate and transport characteristics, as discussed below.

Groundwater quality data collected by GI/Vishay found 1,2-DCB present at depths ranging from 240 ft-bgs to 418 ft-bgs immediately east of the NCIA (WP-01,WP-02, and WP-03; Figure 14).[3] Given the concentrations at which 1,2-DCB has been detected immediately adjacent to the NCIA and the southwesterly groundwater flow direction, one can conclude that GI/Vishay's plume of 1,2-DCB is impacting NCIA groundwater. Elevated concentrations of PCE and TCE have been detected in the same depth intervals as 1,2-DCB, at concentrations up to 500 µg/L and 3,700 µg/L, respectively (Table 1). By GI/Vishay's own metric, collocated 1,2-DCB, PCE, and TCE indicates the presence of contamination from the GI/Vishay facility which is migrating into the NCIA. Notably, the plume identified at WP-01, WP-02, and WP-03 is enriched in TCE relative to PCE, a signature of the Upgradient Plume and further evidence that contamination from the Upgradient Parties is impacting NCIA groundwater.

Table 1. Delineation of Upgradient Plume Using 1,2-DCB as a Marker Compound

Depth Profile ID	Location	Depth Interval Associated with Upgradient Plume - based on 1,2-DCB presence (ft-bgs)	Range of 1,2-DCB Concentrations in Upgradient Plume Depth Interval (µg/L)[3]	Range of PCE Concentrations in Upgradient Plume Depth Interval (µg/L)[3]	Range of TCE Concentrations in Upgradient Plume Depth Interval (µg/L)[3]
WP-01	NCIA	285-366	ND - 450	ND-500	490-3,700
WP-02	East of NCIA	240-378	ND - 300	39-490	210-550
WP-03	East of NCIA	276-418	ND - 150	0.4-160	2.6-1,400

Note:
ND = Not Detected; 1,2-DCB = 1,2-Dichlorobenzene; PCE = Tetrachloroethylene; TCE = Trichloroethylene; cis-1,2-DCE = cis-1,2-Dichloroethylene; NCIA = New Cassel Industrial Area.

However, 1,2-DCB has been infrequently detected within OU1, a fact which has been cited by GI/Vishay as evidence that their plume has not impacted OU1 groundwater. This conclusion is flawed; 1,2-DCB does not migrate as quickly or as far as PCE and TCE due to its relatively high organic carbon partition coefficient, low aqueous solubility, and faster degradation rate (Table 2). Based on these fate and transport characteristics and typical hydrogeological parameters for the Magothy Aquifer, a groundwater plume of TCE, originating from source areas on the Sylvania and GI/Vishay facilities, would be expected to migrate approximately 6 times farther than 1,2-DCB (Figure 15). Even assuming no degradation, TCE would still be expected to travel 1.5 times farther than 1,2-DCB (Figure 15). Since 1,2-DCB has been documented in groundwater samples collected within and adjacent to the NCIA, approximately 3,800 feet from its source area on the GI/Vishay property, TCE associated with the contamination from the Upgradient Parties would be expected to migrate into OU1 – a conclusion that has been confirmed by the vertical profiling groundwater quality data (WP-04, WP-06, MW-209).

3. The Contaminant Transport Modeling Conducted by GI/Vishay Shows that Contamination from the Upgradient Parties Migrates into OU1

[5] Sobieraj, JA. [WSP Engineering of New York, P.C. (WSP)]. 2015. "Affidavit in Support of the State's Motion to Approve the Consent Decree and in Reply to Frost Street Parties' Opposition." January 12.

Finally, in addition to depth and chemical signature detailed above, groundwater and contaminant transport modeling undertaken by GI/Vishay in 2010[3] also demonstrates that the Upgradient Plume is migrating into the NCIA and OU1. GI/Vishay used the measured concentrations for 1,2-DCB, a GI/Vishay marker compound, to first calibrate a contaminant transport model, which was then used to estimate the downgradient extent of the PCE and TCE plumes associated with just the GI/Vishay facility.[3] The GI/Vishay model predicted that plumes for PCE and TCE attributable just to the GI/Vishay sources, extend a considerable distance (up to 1,600 feet) into OU1 (Figures 16 and 17).

Overall, based on all available data, it is clear that the contamination from the Upgradient Parties migrates into OU1 at depths ranging from approximately 200 to 420 ft-bgs with total TCE and PCE concentrations in excess of 1,000 µg/L (Figure 18). Each of the lines of evidence presented above, including results from the depth profiles, chemical signatures, and GI/Vishay's own groundwater solute transport model, demonstrate conclusively that the Upgradient Plume impacts groundwater quality within the NCIA and OU1. There is more than sufficient evidence for the Agency to conclude that the Upgradient Parties are Potentially Responsible Parties for contamination in OU1. Continued efforts by the Upgradient Parties to extricate themselves from efforts to remediate OU1 and OU3 (if necessary) will only lead to a diversion of the limited NCIA resources that are available for the development of an appropriate OU1 remedy.

Very truly yours,

Robert R. Lucic

Enc.

Table 2. Chemical Specific Parameters Affecting Migration Rate and Distance

Parameter	Units	1,2-DCB	TCE	PCE
Organic Carbon Partition Coefficient (Koc) [1]	L/Kg	383	60.7	94.9
Retardation Factor [2]	-	1.7	1.1	1.2
Aerobic Half-Life [3,4] [Range of Literature Cited Values]	yr	0.2 [0.07 - 0.5]	0.7 [0.5 - 1]	1.4 [1 - 2]
Aqueous Solubility [1]	mg/L	156	1,280	206

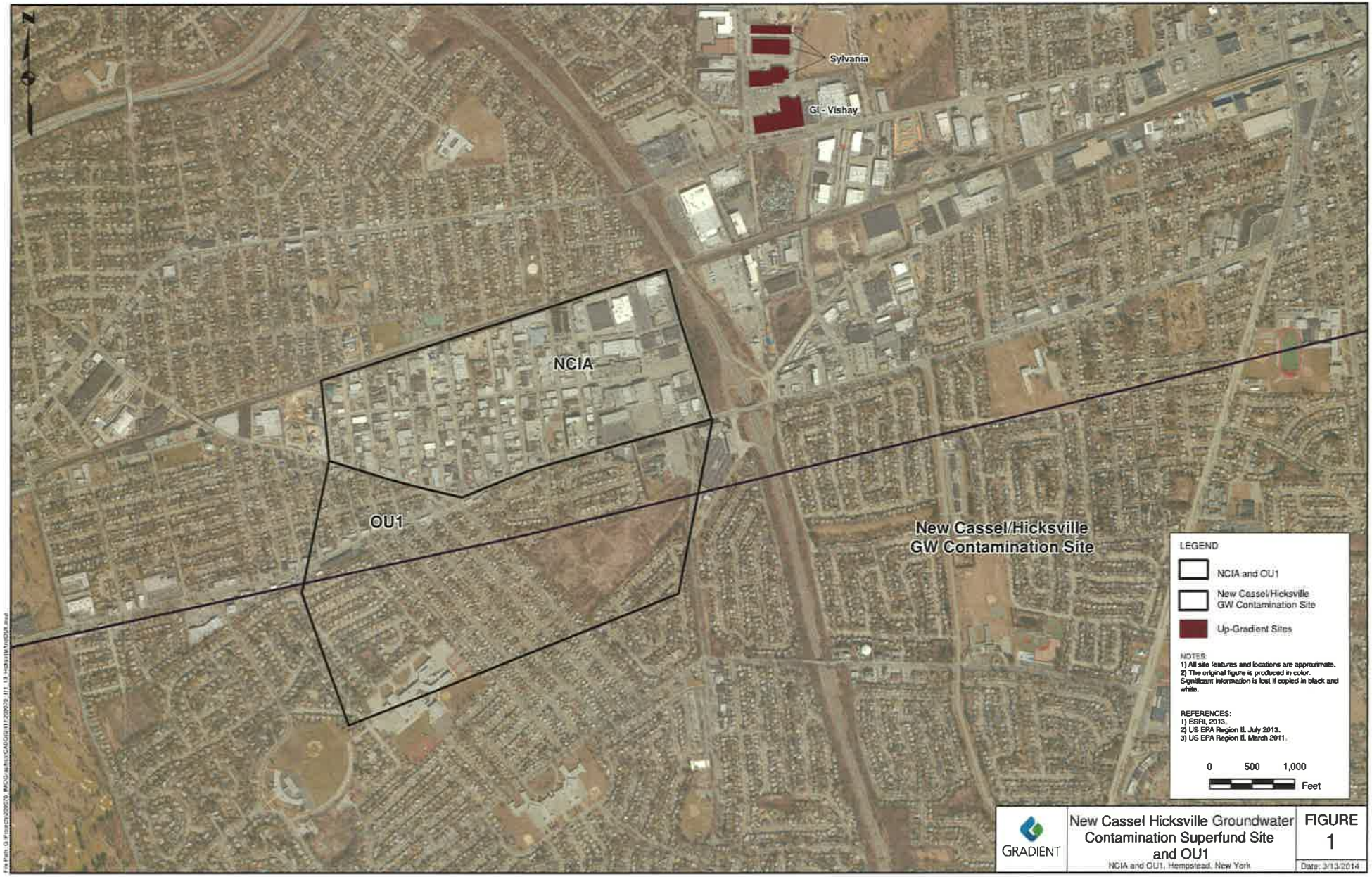
Sources:

1) The Risk Assessment Information System - Chemical Specific Parameters. Accessed on 2/16/15 at: http://rais.ornl.gov/cgi-bin/tools/TOX_search?select=chem_spef.

2) Fraction organic carbon = 0.0003; bulk density = 1.85 g/cm^3; effective porosity = 0.3.

3) Mackay, D; Shiu, WY; Ma, KC; Lee, SC. 2006. "Handbook of Physical-Chemical Properties and Environmental Fate for Organic Chemicals (Second Edition). Volume II: Halogenated Hydrocarbons." CRC Press (Boca Raton, FL). 1336p.

4) Lawrence, S. USGS Report. Description, Properties, and Degradation of Selected Volatile Organic Compounds Detected in Ground Water — A Review of Selected Literature. 2006



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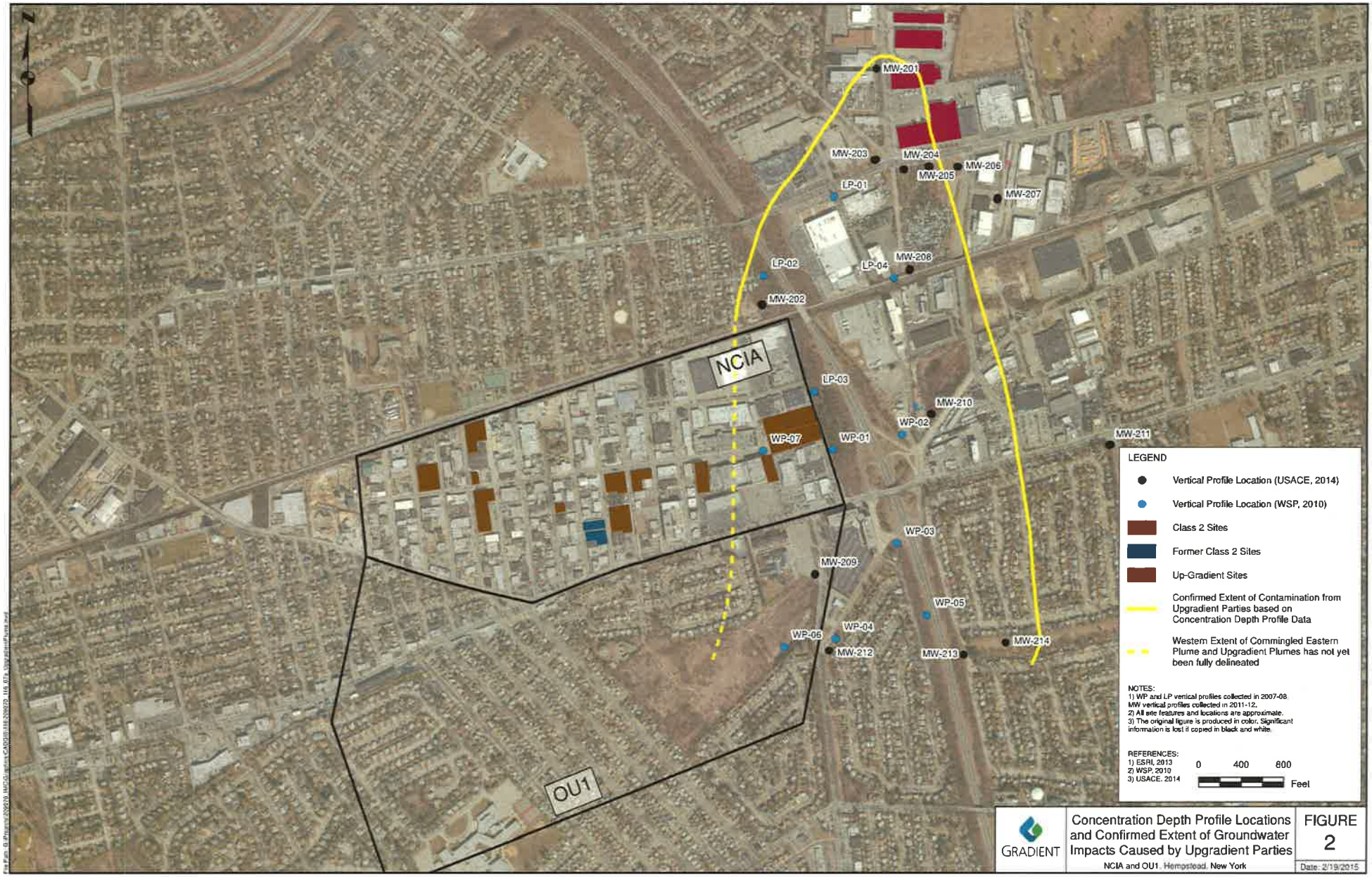
New Cassel Hicksville Groundwater Contamination Superfund Site and OU1

NCIA and OU1, Hempstead, New York

FIGURE 1

Date: 3/13/2014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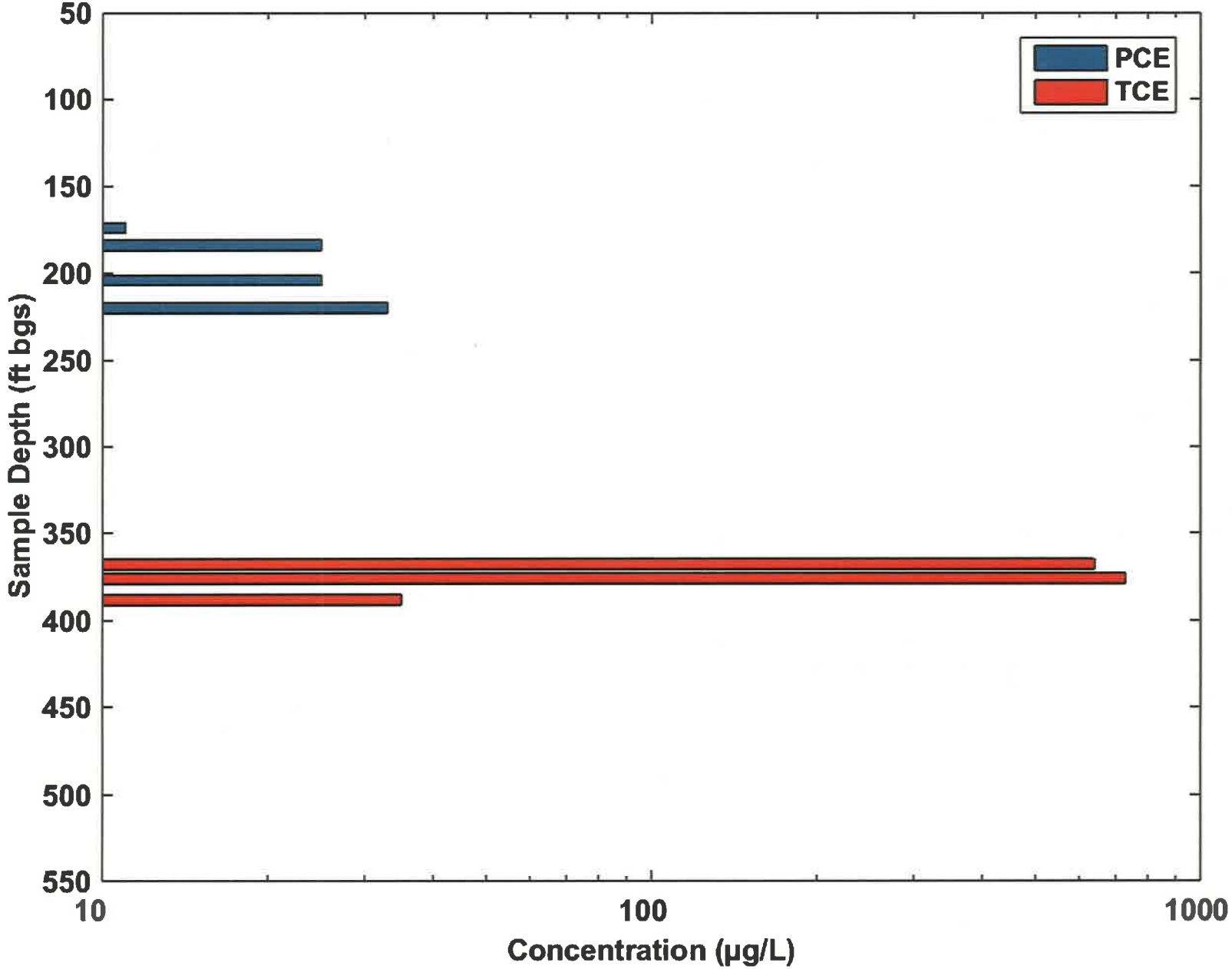
MW-201
MW-203
MW-204
MW-205
MW-206
MW-207
LP-01
LP-02
LP-04
MW-208
MW-202
NCIA
LP-03
MW-210
WP-02
WP-07
WP-01
MW-211
WP-03
MW-209
WP-05
WP-04
WP-06
MW-212
MW-213
MW-214
OU1
LEGEND
Vertical Profile Location (USACE, 2014)
Vertical Profile Location (WSP, 2010)
Class 2 Sites
Former Class 2 Sites
Up-Gradient Sites
Confirmed Extent of Contamination from Upgradient Parties based on Concentration Depth Profile Data
Western Extent of Commingled Eastern Plume and Upgradient Plumes has not yet been fully delineated
NOTES:
1) WP and LP vertical profiles collected in 2007-08. MW vertical profiles collected in 2011-12.
2) All site features and locations are approximate.
3) The original figure is produced in color. Significant information is lost if copied in black and white.
REFERENCES:
1) ESRI, 2013
2) WSP, 2010
3) USACE, 2014
0
400
800
Feet
GRADIENT
Concentration Depth Profile Locations and Confirmed Extent of Groundwater Impacts Caused by Upgradient Parties
NCIA and OU1, Hempstead, New York
FIGURE 2
Date: 2/19/2015



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LP-02 Concentration Depth Profile

NCIA and OU1, Hempstead, New York

FIGURE 3

Date: 02/18/2015

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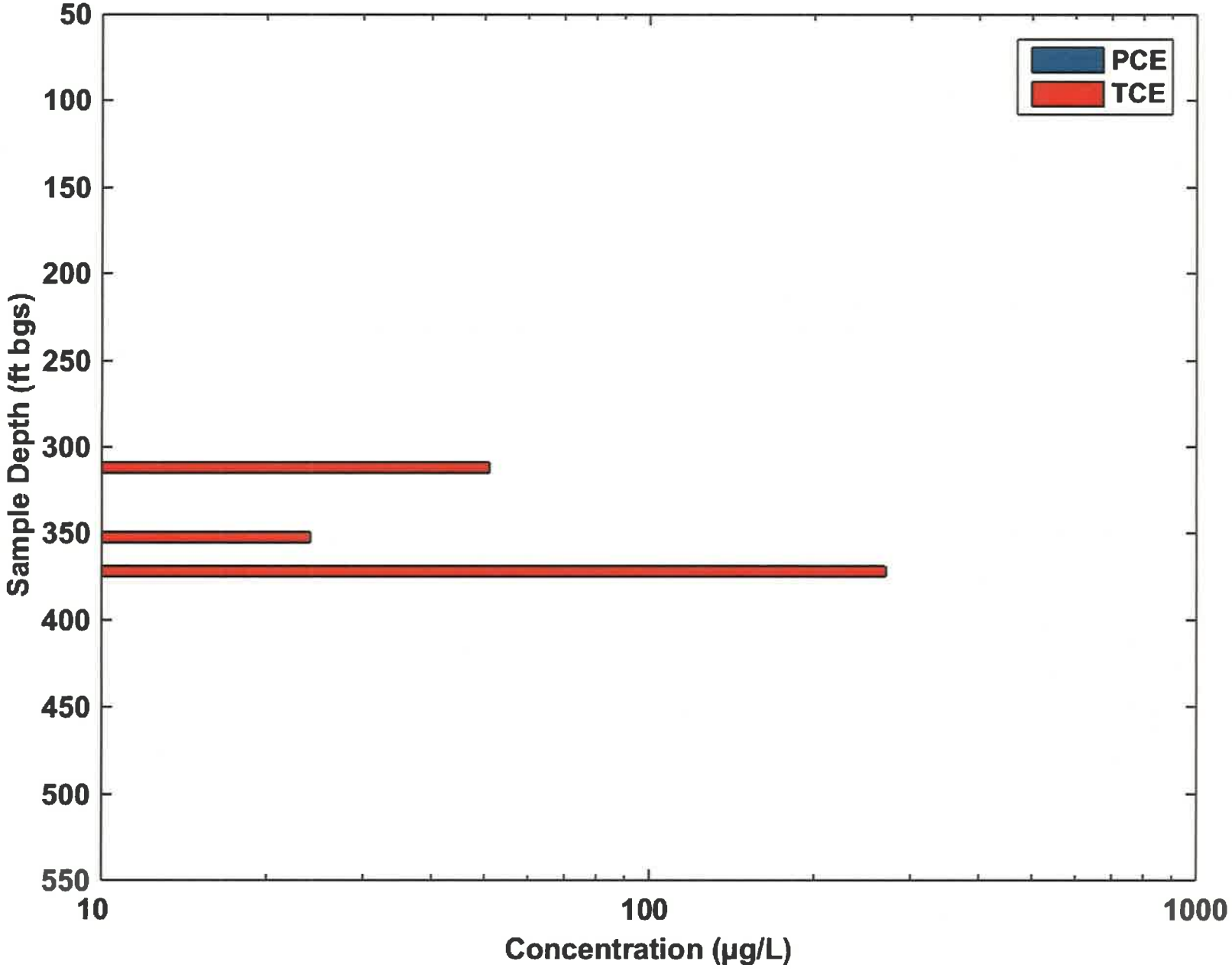


GRADIENT

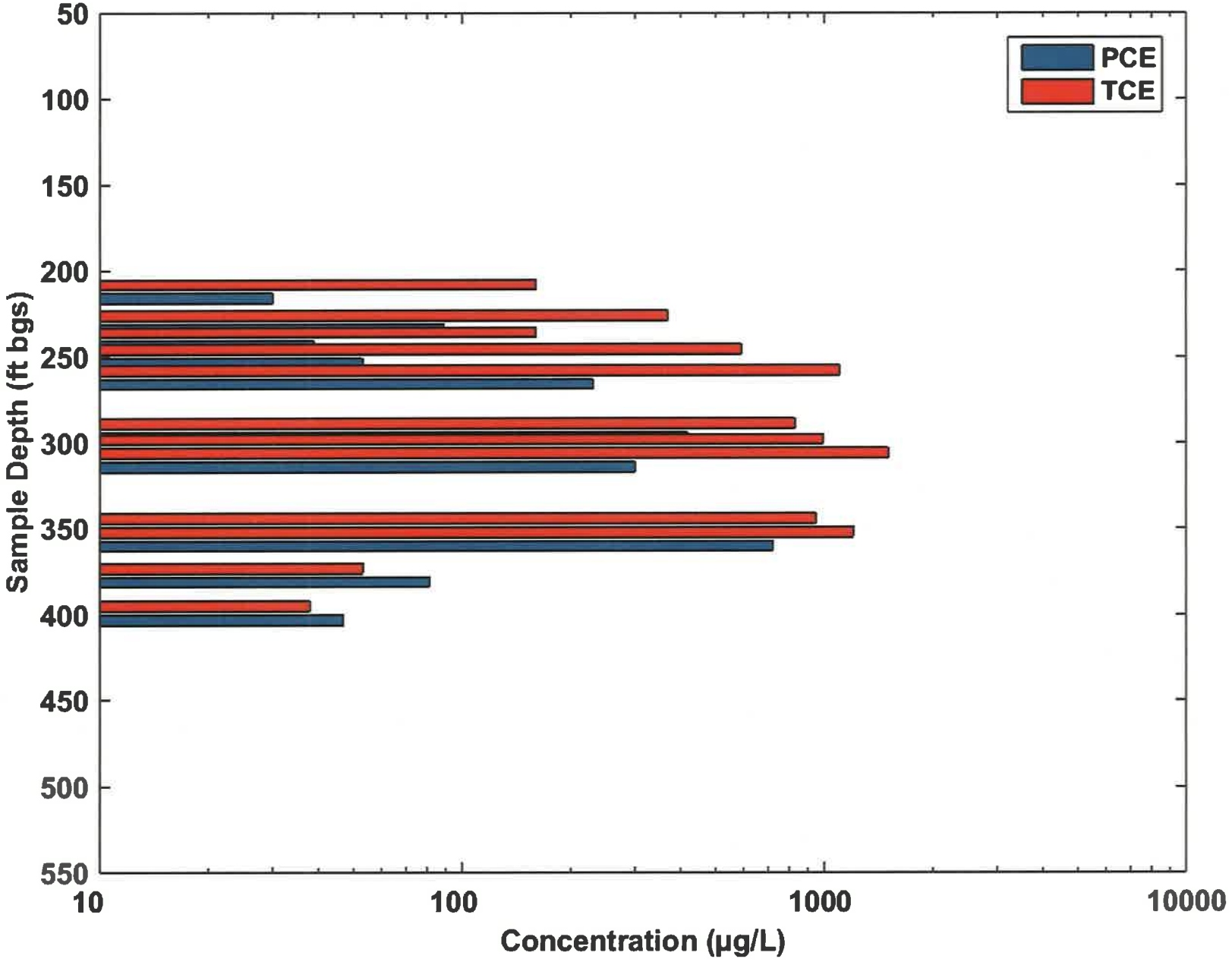
MW-202 Concentration Depth Profile

NCIA and OU1, Hempstead, New York

FIGURE 4

Date: 02/18/2015

File Path: \\camfs\G Drive\Projects\2009\70 IMC\Working Files\CBRL\after Figures Feb2015\Figure 4.ai



GRADIENT

LP-03 Concentration Depth Profile

NCIA and OU1, Hempstead, New York

FIGURE 5

Date: 02/18/2015

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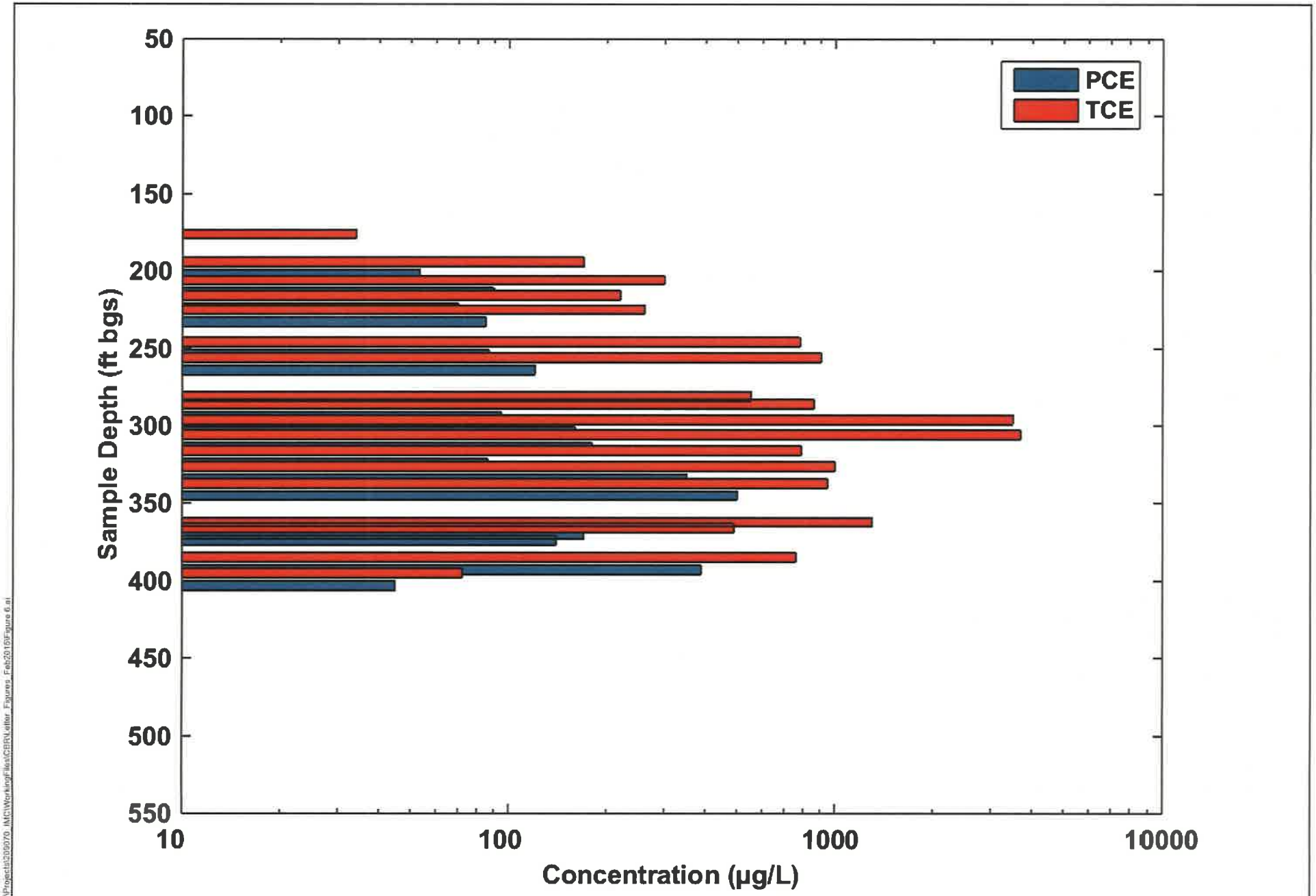

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WP-01 Concentration Depth Profile

NCIA and OU1, Hempstead, New York

FIGURE 6

Date: 02/18/2015

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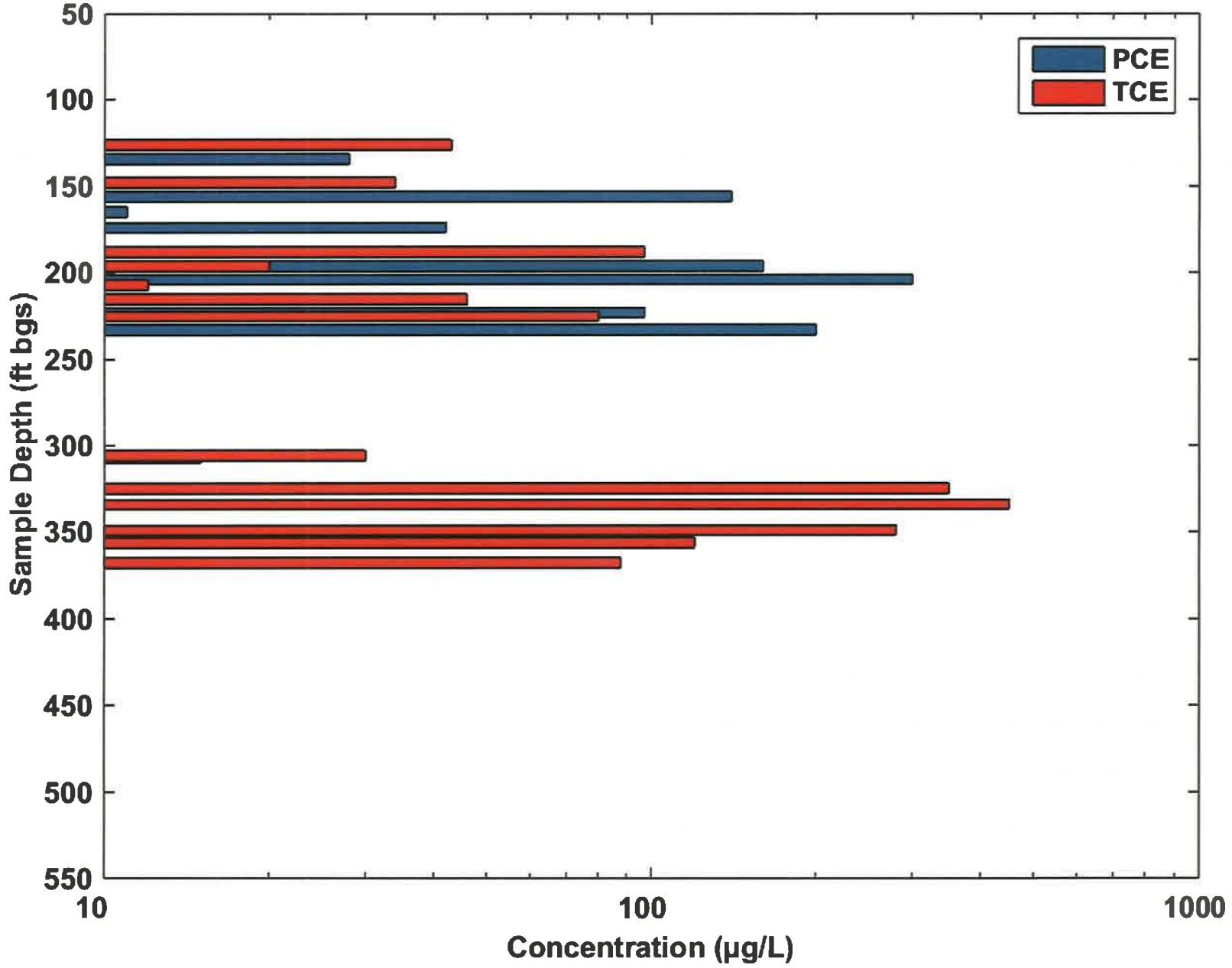

GRADIENT

LP-01 Concentration Depth Profile

NCIA and OU1, Hempstead, New York

FIGURE 7

Date: 02/18/2015

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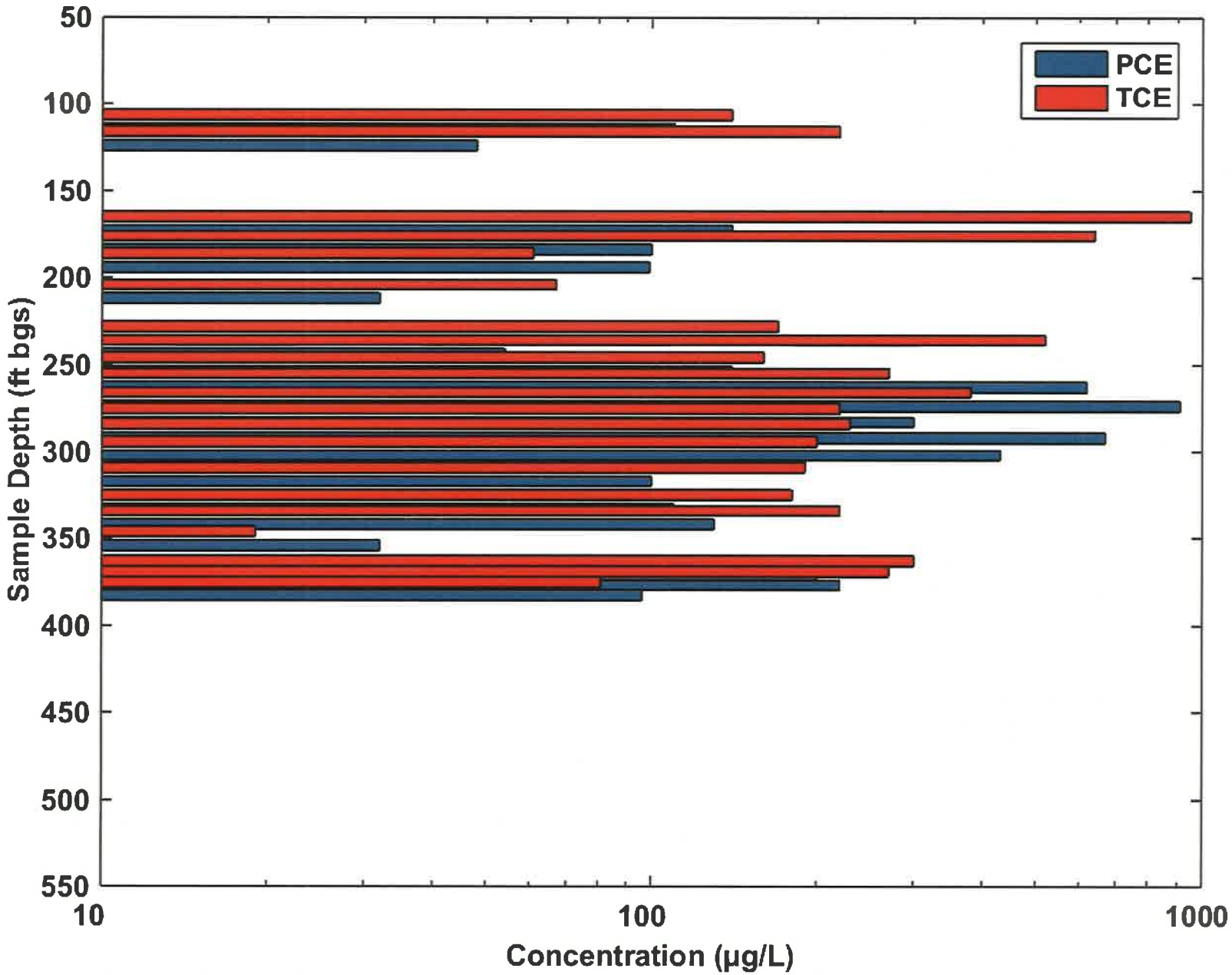

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LP-04 Concentration Depth Profile

NCIA and OU1, Hempstead, New York

FIGURE 8

Date: 02/18/2015

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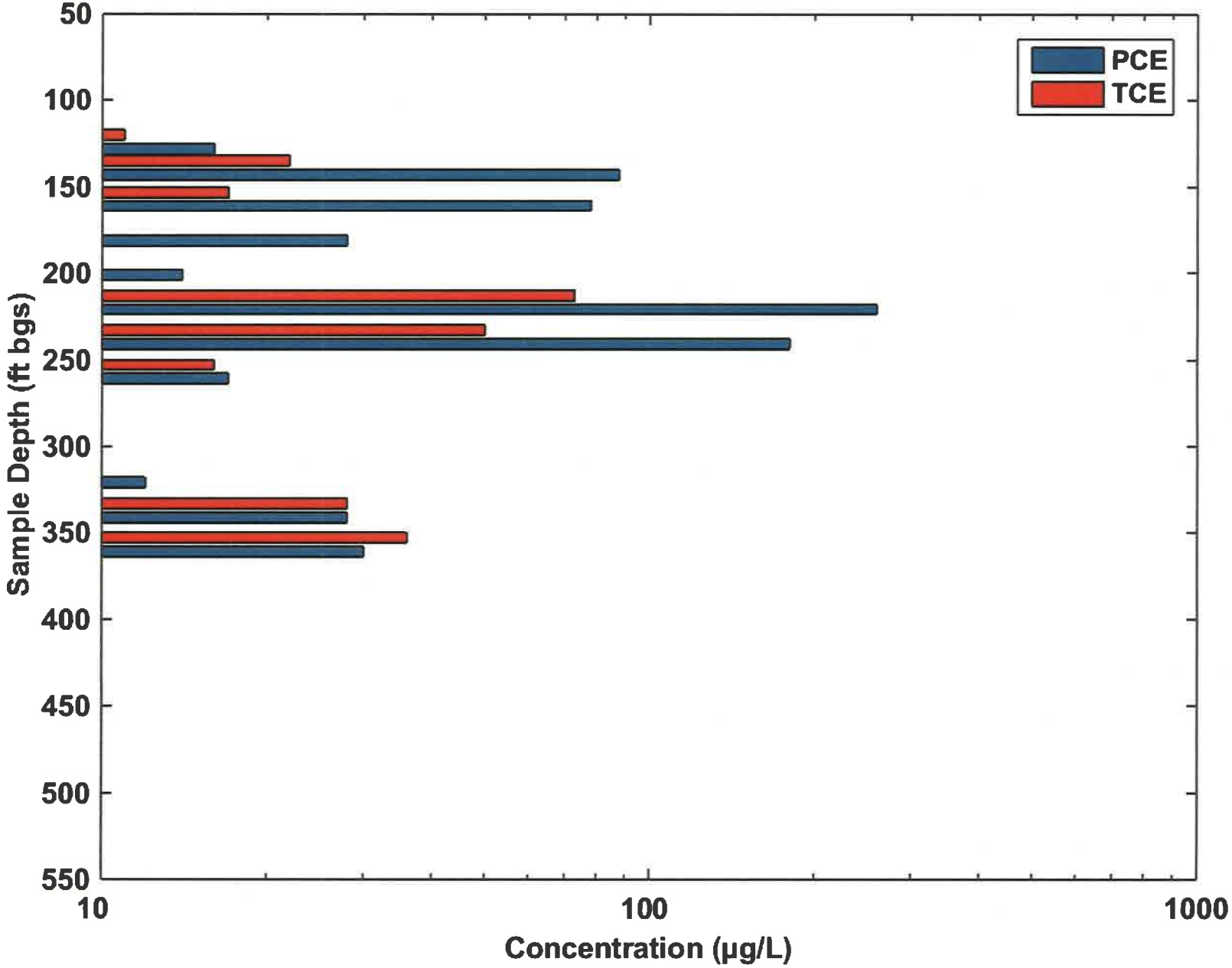


GRADIENT

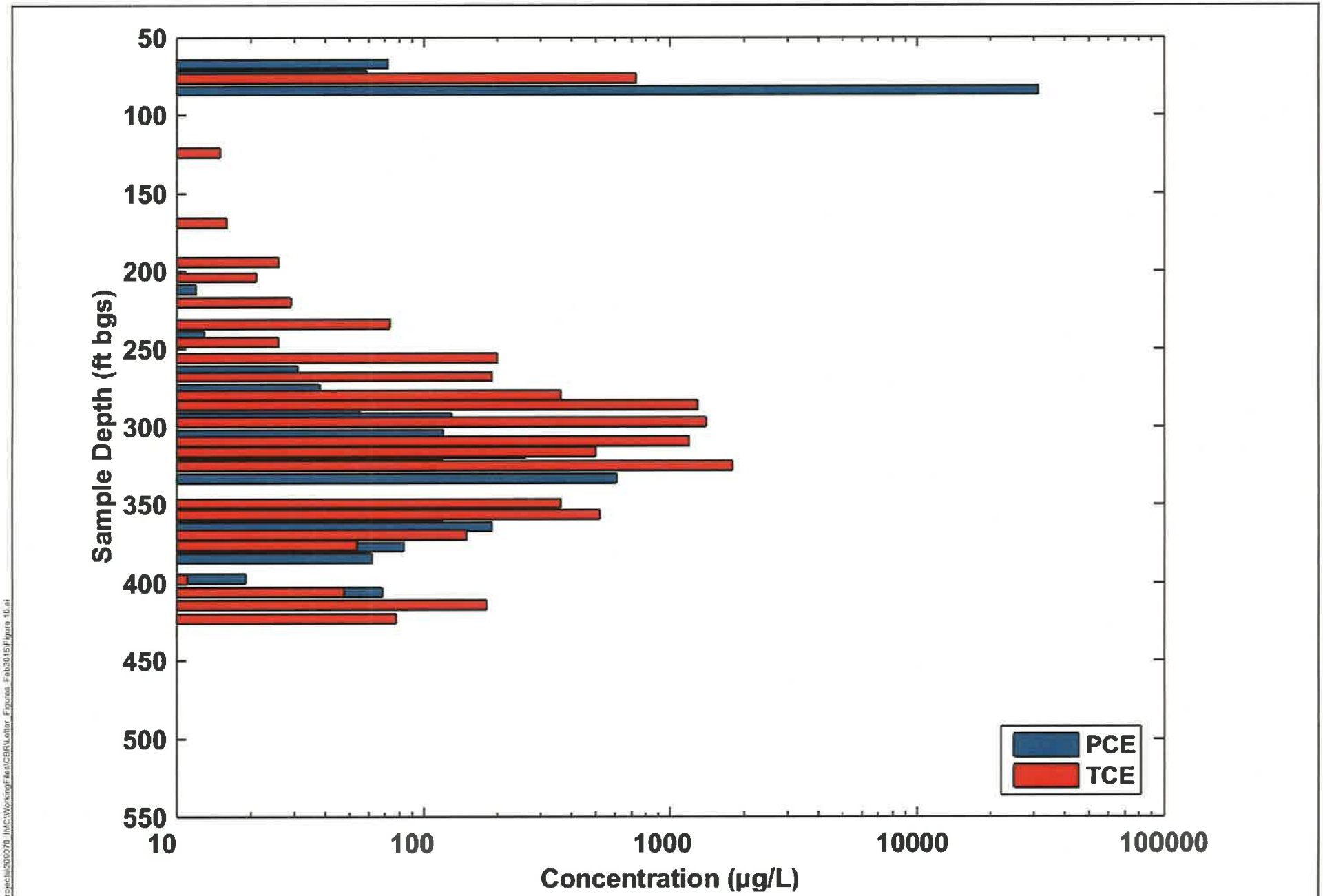
MW-208 Concentration Depth Profile

NCIA and OU1, Hempstead, New York

FIGURE 9

Date: 02/18/2015

File Path: \\camfs\G_Drive\Projects\2009\70_IMC\Working\Files\CBR\Letter_Figures_Feb2015\Figure 9.ai



GRADIENT

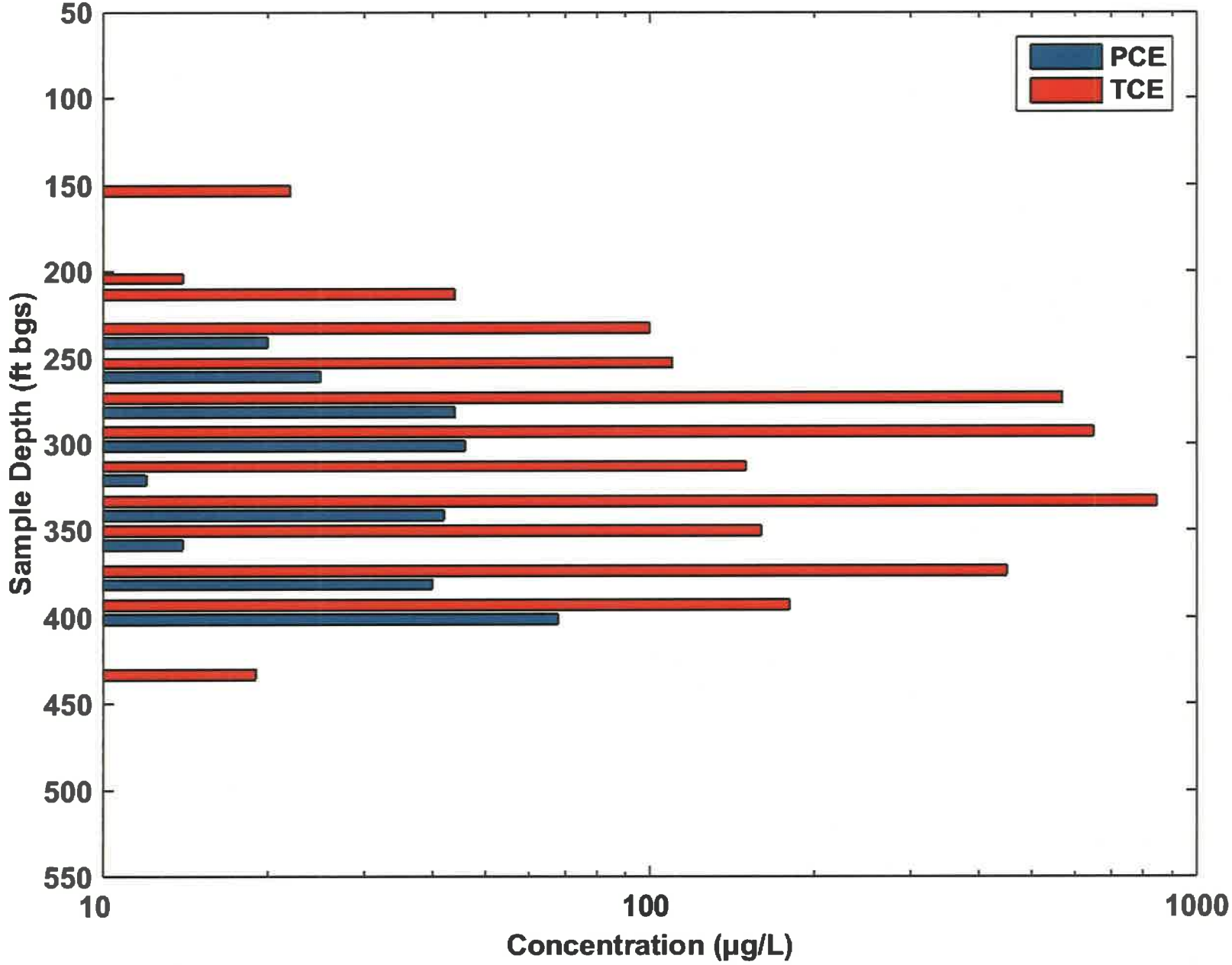
WP-07 Concentration Depth Profile

NCIA and OU1, Hempstead, New York

FIGURE 10

Date: 02/18/2015

File Path: \\camfs\G_Drive\Projects\200070 IM\GIS\Working\Files\CBRU.etter_Figures_Feb2015\Figure 10.ai



GRADIENT

MW-209 Concentration Depth Profile

NCIA and OU1, Hempstead, New York

FIGURE 11

Date: 02/18/2015

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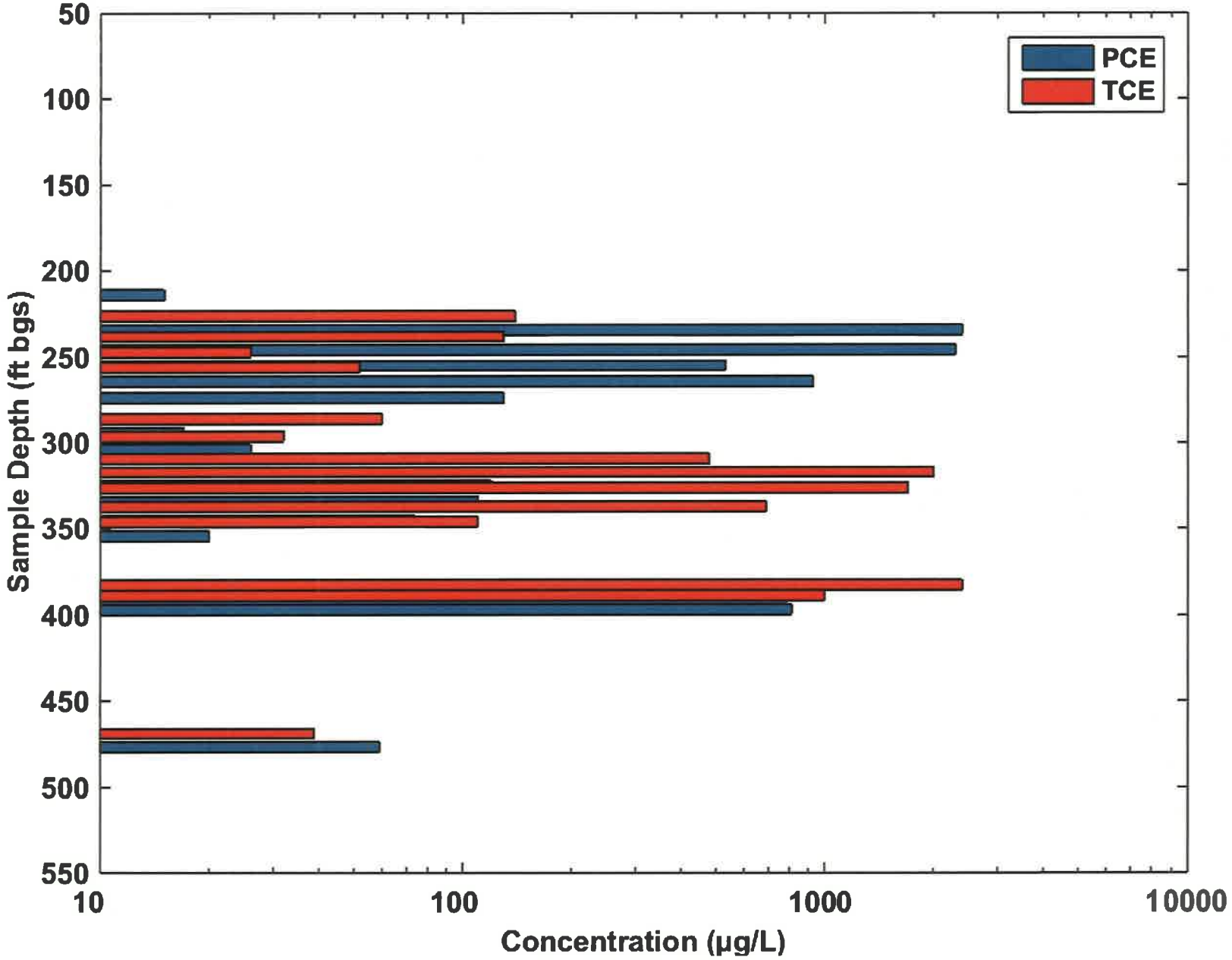

GRADIENT

WP-06 Concentration Depth Profile

NCIA and OU1, Hempstead, New York

FIGURE 12

Date: 02/18/2015

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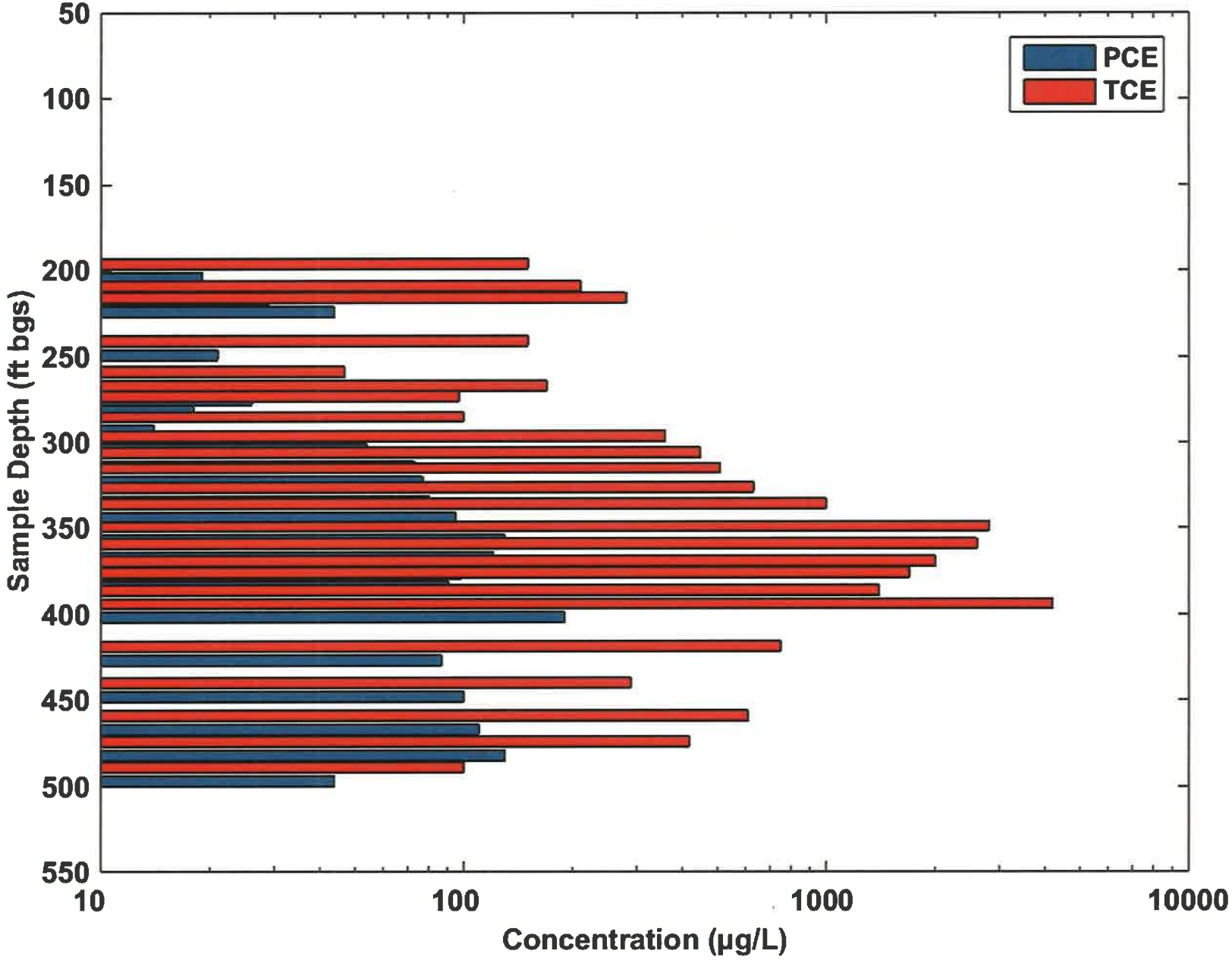

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WP-04 Concentration Depth Profile

NCIA and OU1, Hempstead, New York

FIGURE 13

Date: 02/18/2015

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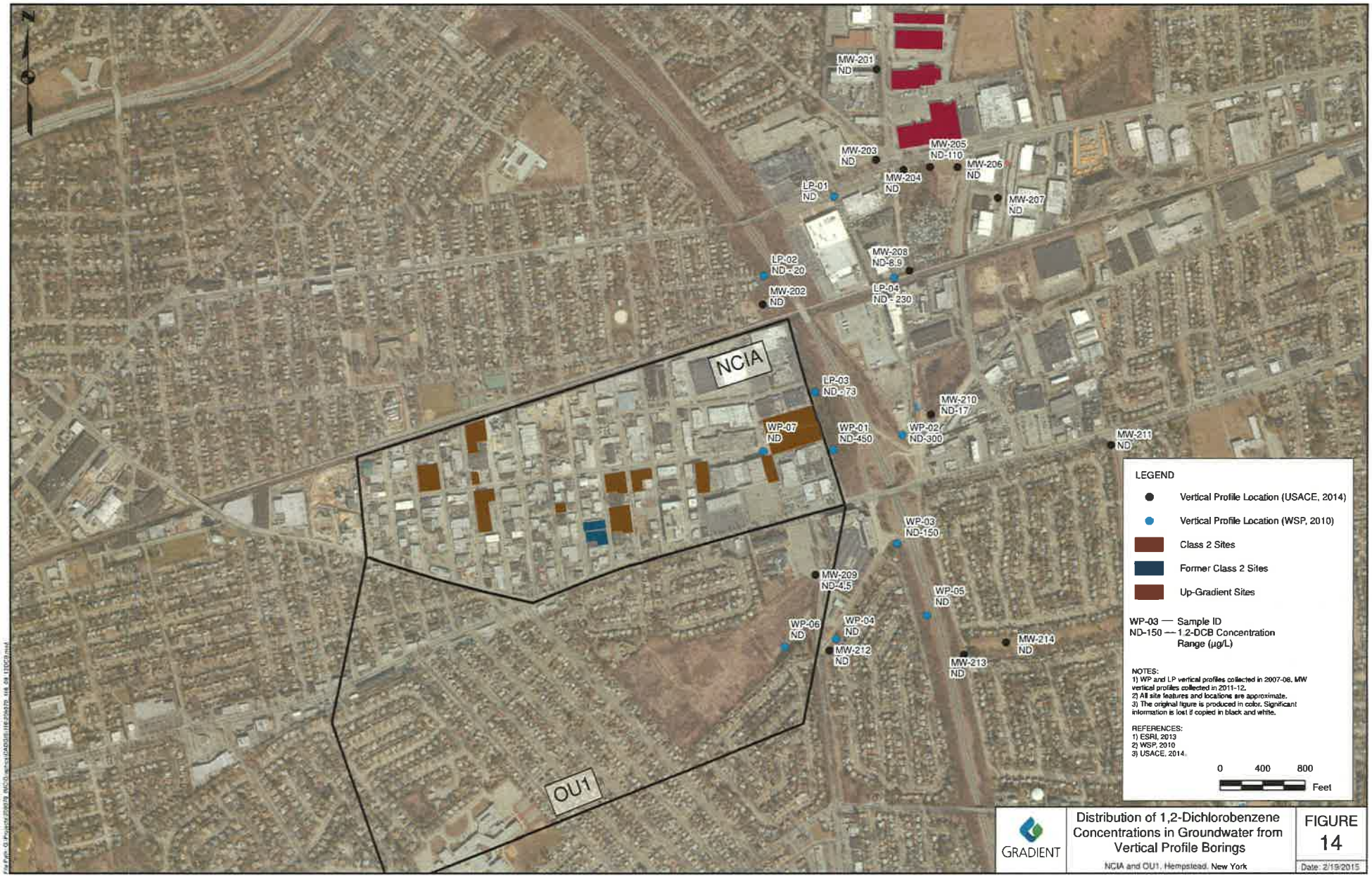
N
MW-201 ND
MW-203 ND
MW-205 ND-110
MW-206 ND
MW-204 ND
LP-01 ND
MW-207 ND
MW-208 ND-6.9
LP-02 ND - 20
LP-04 ND - 230
MW-202 ND
NCIA
LP-03 ND - 73
MW-210 ND-17
WP-07 ND
WP-01 ND-450
WP-02 ND-300
MW-211 ND
WP-03 ND-150
MW-209 ND-4.5
WP-05 ND
WP-06 ND
WP-04 ND
MW-212 ND
MW-214 ND
MW-213 ND
OU1
LEGEND
Vertical Profile Location (USACE, 2014)
Vertical Profile Location (WSP, 2010)
Class 2 Sites
Former Class 2 Sites
Up-Gradient Sites
WP-03 — Sample ID
ND-150 — 1,2-DCB Concentration Range (µg/L)
NOTES:
1) WP and LP vertical profiles collected in 2007-08. MW vertical profiles collected in 2011-12.
2) All site features and locations are approximate.
3) The original figure is produced in color. Significant information is lost if copied in black and white.
REFERENCES:
1) ESRI, 2013
2) WSP, 2010
3) USACE, 2014.
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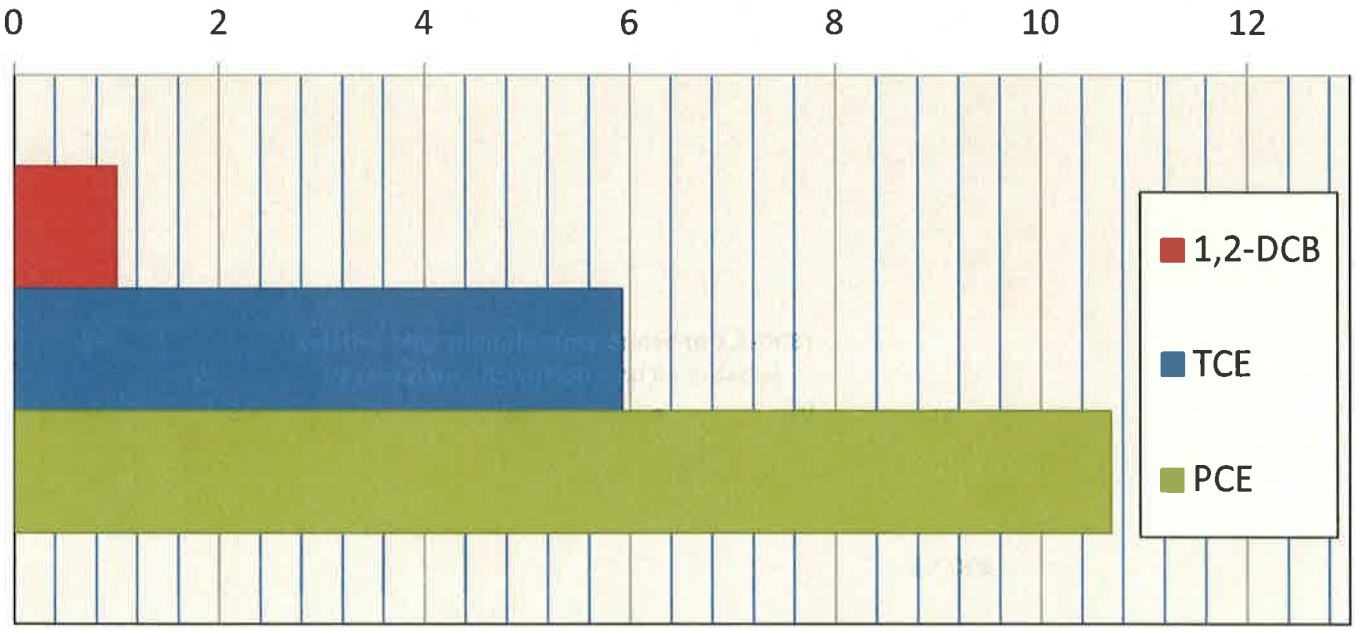
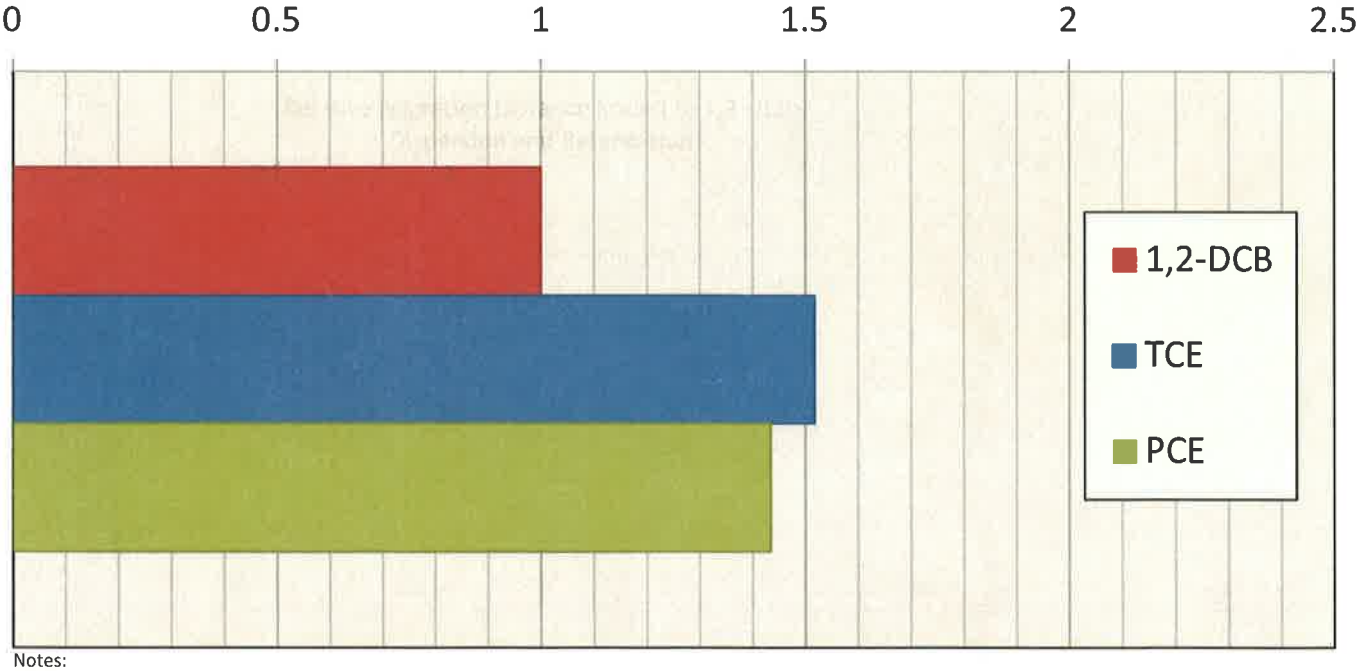
Feet
GRADIENT
Distribution of 1,2-Dichlorobenzene Concentrations in Groundwater from Vertical Profile Borings
NCIA and OU1, Hempstead, New York
FIGURE 14
Date: 2/19/2015

Relative Migration Distance Scaled to 1,2-DCB: Degradation, Dispersion, and Retardation



Relative Migration Distance Scaled to 1,2-DCB: Dispersion and Retardation



Notes:

1) Transport distances calculated using 1D advection dispersion equation for a 20 year timeframe.

2) Scaled values reflect distance for plumes to attenuate from source area concentration (maximum concentrations detected: 28 mg/L of 1,2-DCB at W-1-75, 48 mg/L of TCE at W-1-75, and 32 mg/L of PCE at P-108) to their respective NY State water quality standard.

3) Chemical specific parameters detailed in Table 2 and typical hydrogeological parameter values for sand and gravel aquifers (*e.g.* hydraulic conductivity = 90 ft./d, hydraulic gradient = 0.0015 ft./ft., porosity = 30%, and longitudinal dispersivity = 1 meter) used in these calculations.

GRADIENT	Expected Migration Distances of TCE and PCE Plumes Relative to 1,2-DCB NCIA and OU1, Hempstead, New York	FIGURE 15 Date: 02/18/2015

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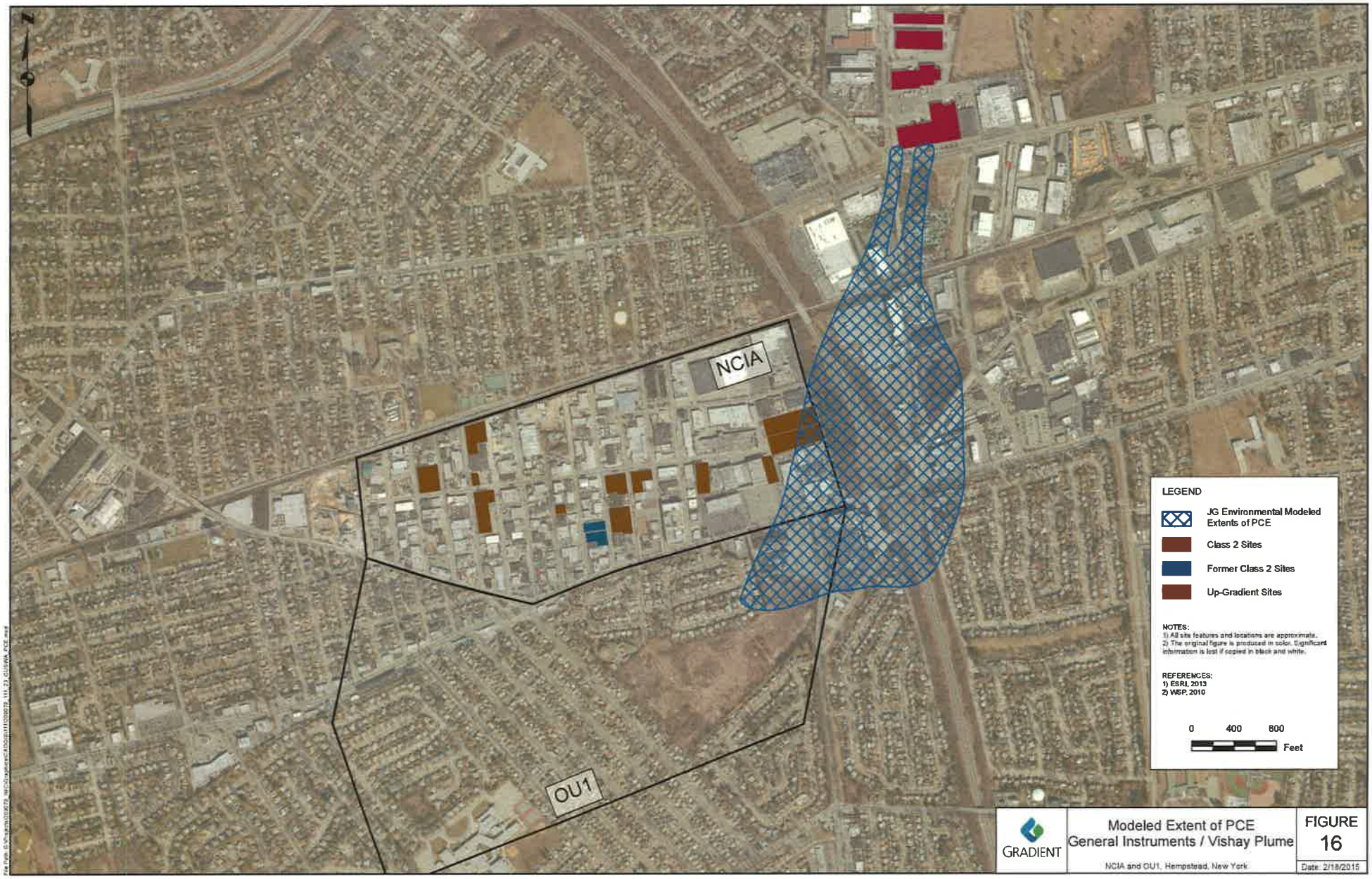


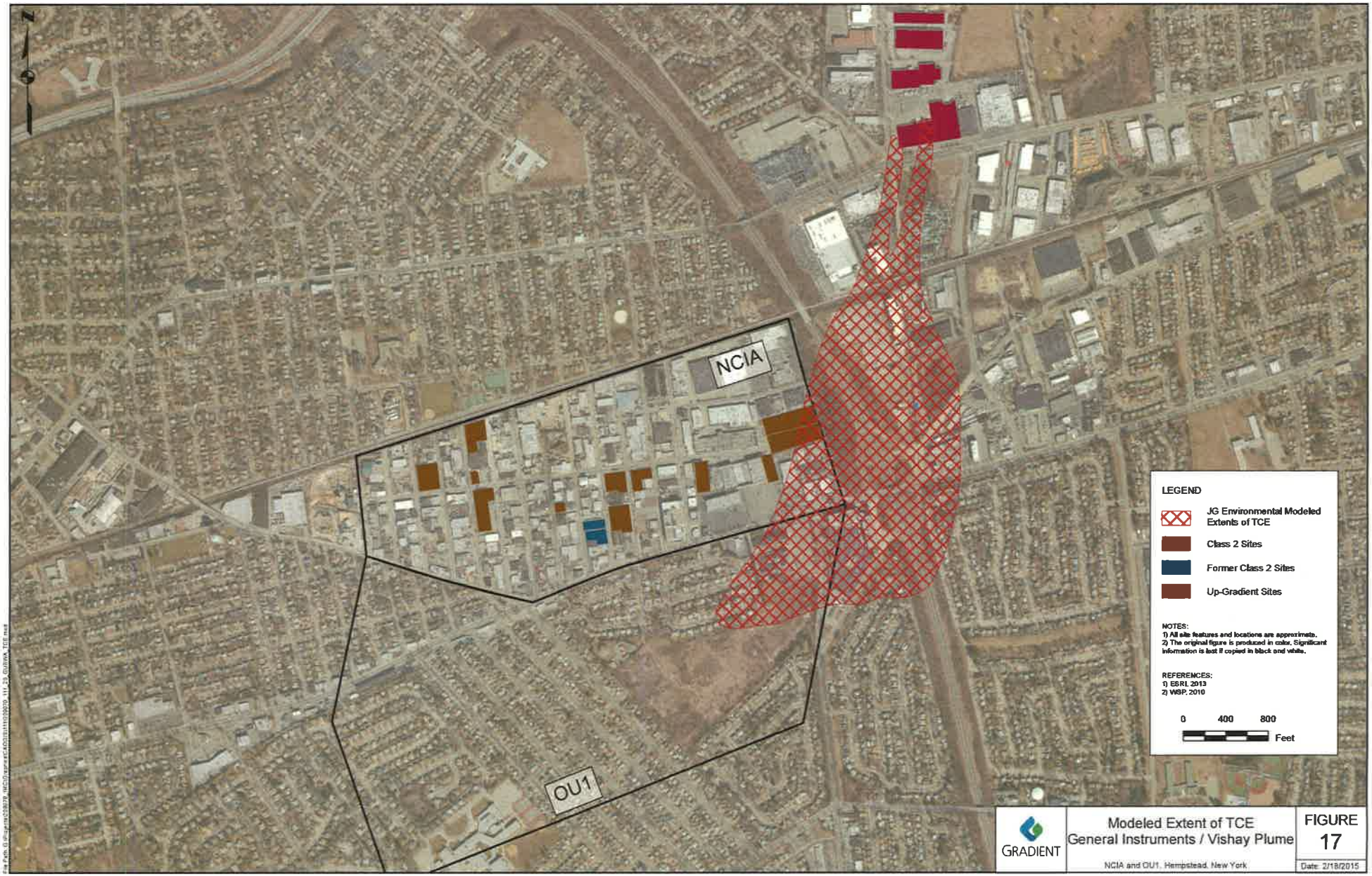
GRADIENT

Modeled Extent of PCE
General Instruments / Vishay Plume

NCIA and OU1, Hempstead, New York

FIGURE 16

Date: 2/18/2015

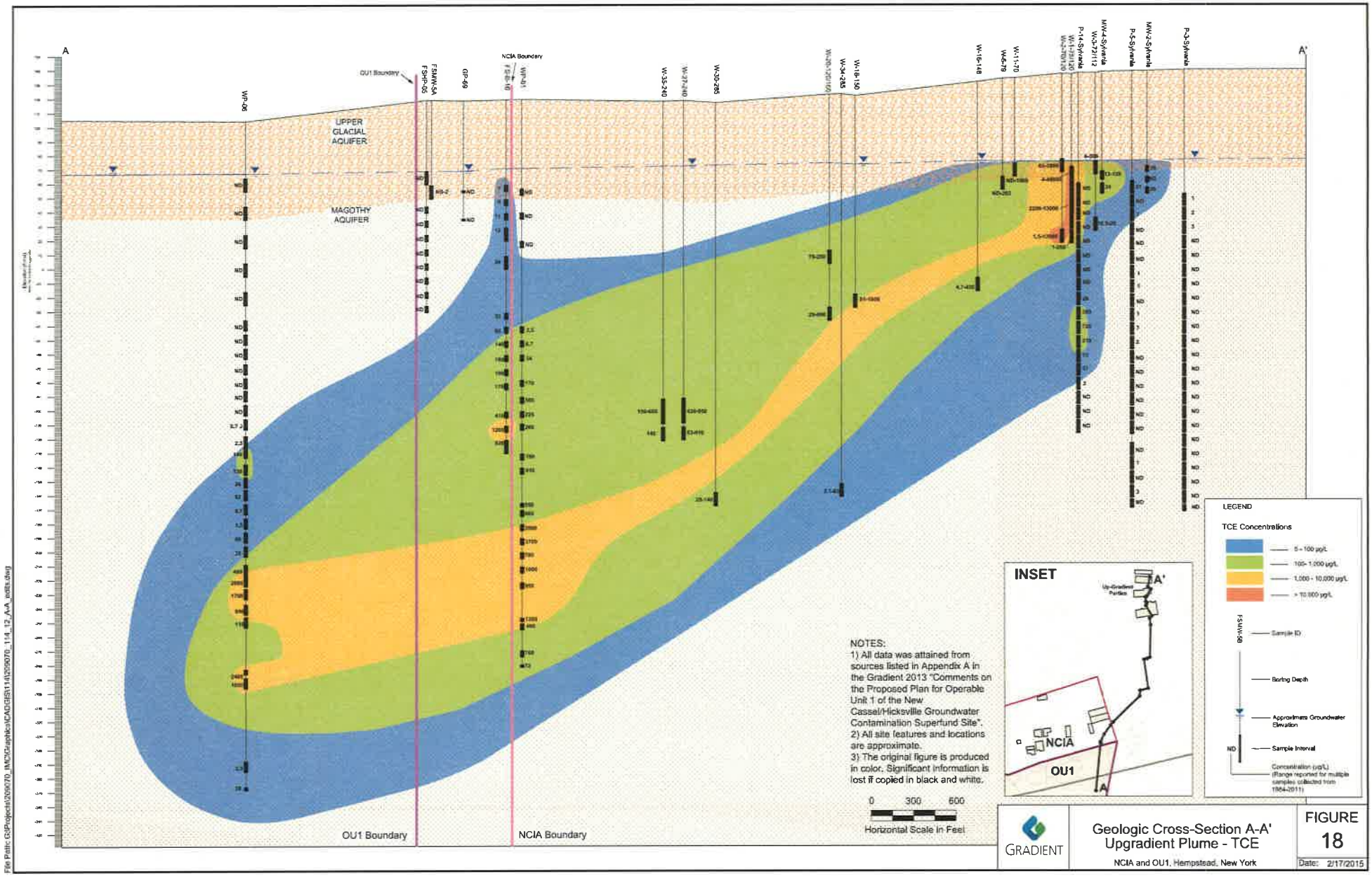


GRADIENT

Modeled Extent of TCE
General Instruments / Vishay Plume
NCIA and OU1, Hempstead, New York

FIGURE
17

Date: 2/18/2015



GRADIENT

Geologic Cross-Section A-A' Upgradient Plume - TCE

NCIA and OU1, Hempstead, New York

FIGURE 18

Date: 2/17/2015

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